

Claims

1. A hybrid fuel cell comprising:
a fuel cell portion; and
a rechargeable battery portion;
said fuel cell portion and said rechargeable battery portion
5 being adapted to operate alone or in tandem;
said fuel cell portion and said rechargeable battery portion
being adapted to share at least one reactant.
2. The hybrid fuel cell according to claim 1, wherein said
hybrid fuel cell further comprises an anode section including one
or more anodes disposed between said fuel cell portion and said
rechargeable battery portion.
3. The hybrid fuel cell according to claim 2, wherein said
anode section is shared between said fuel cell portion and said
rechargeable battery portion.
4. The hybrid fuel cell according to claim 2, wherein said
anode comprises an anode active material, said anode active
material including zinc, cadmium, magnesium, or aluminum.
5. The hybrid fuel cell according to claim 4, wherein said
anode comprises 90 to 99 weight percent of said anode active

material and 1 to 10 weight percent of a binder material.

6. The hybrid fuel cell according to claim 2, wherein said anode comprises a hydrogen storage material and/or Raney nickel.

7. The hybrid fuel cell according to claim 6, wherein said anode comprises 0.0 to 88.0 weight percent of said hydrogen storage material, 0.0 to 88.0 weight percent Raney nickel, 4.0 to 12.0 weight percent of a binder material, and 0.0 to 5.0 weight percent of a conductive material.

8. The hybrid fuel cell according to claim 7, wherein said conductive material comprises graphite or graphitized carbon.

9. The hybrid fuel cell according to claim 7, wherein said hydrogen storage material comprises Rare-earth metal alloys, Misch metal alloys, zirconium alloys, titanium alloys, magnesium/nickel alloys, or mixtures thereof.

10. The hybrid fuel cell according to claim 2, wherein said fuel cell portion comprises at least one cathode, said cathode being in electrical communication with said anode.

11. The hybrid fuel cell according to claim 10, wherein said

cathode comprises a carbon matrix with an active catalyst material catalytic toward the dissociation of molecular oxygen dispersed therein.

12. The hybrid fuel cell according to claim 11, wherein said active catalyst material is selected from silver, silver alloys, silver oxide, cobalt, cobalt oxide, cobalt manganese oxide, nickel, manganese oxide, manganese dioxide, pyrolyzed macrocyclics, or combinations thereof.

13. The hybrid fuel cell according to claim 11, wherein said cathode further comprises a peroxide decomposing material.

14. The hybrid fuel cell according to claim 2, wherein said rechargeable battery portion comprises at least one auxiliary electrode, said auxiliary electrode being in electrical communication with said anode.

15. The hybrid fuel cell according to claim 14, wherein said auxiliary electrode comprises a positive electrode material.

16. The hybrid fuel cell according to claim 15, wherein said auxiliary electrode is a nickel electrode.

17. The hybrid fuel cell according to claim 15, wherein said auxiliary electrode is a silver electrode.

18. The hybrid fuel cell according to claim 15, wherein said positive electrode material comprises 75 to 85 weight percent of a positive electrode active material, 0.0 to 10 weight percent cobalt, 0.0 to 10 weight percent cobalt oxide, and 0.0 to 4.0 weight percent of a binder material.

19. The hybrid fuel cell according to claim 18, wherein said positive electrode active material is selected from nickel hydroxide/nickel oxyhydroxide, copper oxide, silver oxide, manganese dioxide, or combinations thereof.

20. The hybrid fuel cell according to claim 1, wherein said rechargeable battery portion is adapted to accept an electrical current from a source of power external to said hybrid fuel cell.

21. The hybrid fuel cell according to claim 1, wherein said rechargeable battery portion is adapted to accept an electrical current produced by said fuel cell portion.

22. The hybrid fuel cell according to claim 1, wherein said fuel cell portion and said rechargeable battery portion share an electrolyte.